

The Engineering Geologist



THE
GEOLOGICAL SOCIETY
OF AMERICA

NEWSLETTER OF THE ENGINEERING GEOLOGY DIVISION OF THE GEOLOGICAL SOCIETY OF AMERICA

Volume 26, Number 2

August 1991

CHAIRMAN'S MESSAGE

This year the many divisions and committees within GSA are submitting ideas to headquarters as part of GSA's long-range planning effort. One of the Publications Committee recommendations is to initiate a new GSA publication titled *Journal of Applied Geology*. This journal would include case histories of engineering geology, hydrogeology, remote sensing, archeology, etc.

Not another journal, you say? Would it compete with the existing EGD special publications "Case Histories" or "Reviews?" But wait - there could be some merit.

When was the last time you read an engineering geology or hydrogeology article in *Geology* or *GSA Bulletin*? These two GSA publications contain plenty of research articles on some disciplines such as deep-sea seismic profiles and plate tectonics. But little for us. I think the reason is not because we do less research or publish less, but the reason is that we tend not to publish through GSA.

Where do engineering geologists publish? Probably in governmental reports or *Bulletin of the Association of Engineering Geologists*, *Engineering Geology*, *Environmental Geology and Water Resources*, *Ground Water*, *Tectonophysics*, or some other specialty journal. So a *Journal of Applied Geology* would help bring back the applied geology people to GSA.

GSA recognizes the importance of applied geology in particular

environmental geology. Everyone's talking environment. The Engineering Geology Division should capitalize on this by changing the name of our division to Environmental and Engineering Geology Division (as I mentioned in the last editorial). At the GSA meeting in Dallas I listened to the "Presidential Address and Awards Ceremonies." It is significant to note that the speeches by these elderly, distinguished geologists, representing many different specialties, had a common theme: environment. It seems that you can be a stratigrapher, structural geologist, etc., all your life....yet your last profound plea is the word "environment." (Something akin to Citizen Kane's dying word: "Rosebud.")

Let's support GSA's move to promote environmental issues and the Publications Committee's recommendation for a new *Journal of Applied Geology*. And when the journal comes out, we need to use it as a forum for publishing our work.

Our profession is one in which our efforts typically lead to mitigation of geologic hazards and hence help towards a general improvement in man's condition. But it is not enough just to write a report for a client, or for in-house circulation. We need to publish this work in scholarly journals and pass on the knowledge learned.

Perry H. Rahn

SYMPOSIUM

GEO-RISK ASSESSMENT

The following papers will be presented at the half-day symposium sponsored by the Engineering Geology Division, San Diego, 1991:

- Barrows, Allan. "California's Landslide Hazard Identification Program."
- Berger, Kenneth. "Risk Management in the Insurance Industry: Applied Geology."
- Campbell, Russell and Richard L. Bernknopf. "Forecasting the Spatial Distribution of Landslide Risk."
- Davidson, Todd. "Comprehensive Erosion Hazard Identification through the National Flood Insurance Program."
- Hughes, Travis. "Hydrogeologic Systems, Contamination and Risk."
- Mann, John. "Hydrogeologic Risk Assessment of Long-term Nonpoint Pollution."
- Snider, Frederick G. and David C. Amick. "Eastern U. S. Seismicity: Assessing the Risk and Evaluating the Hazard."

Short Course

On Sunday, October 20, 1991, at the annual GSA meeting in San Diego a short course entitled "Assessing the Mobility of Chemicals in the Vadose Zone," has been approved for presentation.

The committee responsible for evaluating the scientific merit of the submitted course proposals is made up of: James M. Coleman, Chair; Kevin Burke, Richard G. Craig, Maria Luisa B. Crawford, and Sam B. Upchurch.

For more details see the section titled "San Diego Program."



EG Publications

The abstract below was accepted by the Science Committee for the 6th Congress of IAEG Amsterdam, The Netherlands - August 6-10, 1990.

Engineering Geology in 1990s

Billo, S. M., King Saud University, Riyadh, Saudi Arabia

William Smith was the 19th century founder of engineering geology, and his discovery of the law of faunal succession led him to correlate different strata and to predict the depth of layers to be encountered in subsurface drilling. He was a civil engineer and surveyor who switched to geology to solve the problems and ameliorate the procedures in civil engineering. He published in 1815 the first geologic map of England, Wales, and part of Scotland, and later became known as the "father of Stratigraphy."

The application of the knowledge and methods of geology in engineering decisions such as the planning and building of dams, tunnels, highways, roads, airfields, mines, reservoirs, and heft buildings is relatively new. The \$1.5 billion Aswan high dam is already threatened by earthquakes that could drown Cairo and demolish much of Egypt. The area had been judged aseismic at first, but the November 14, 1981 earthquake and aftershocks may have resulted from the water of Lake Nasser soaking in the porous Nubian sandstones along the Nile River. Oil-producing countries and mining districts around the world are also prone to earthquakes that could be caused by the very process of extracting the fossil fuels and ore minerals. The time series for earthquake frequency and the quantity of fluid injected underground also shows a tip-top correlation.

NOMINEES?

Seeking nominations for two EGD 1991 awards: Distinguished Practice Award - made to an individual who has made exemplary contributions to engineering geology through a distinguished career; and the Meritorious Service Award - made to an individual who has generously devoted his time and expertise to the Division.

Any Engineering Geology Division member may make a nomination. Send the name of the individual and supporting information to: Perry H. Rahn, Chairman, Awards Committee EGD, Department of Geology & Geological Engineering, South Dakota School of Mines & Technology, Rapid City, SD 57701.

RESEARCH AWARD

GSA Engineering Geology Division Student Research Award to:

KEVIN R. HAYES
923 Southgate Drive
State College, PA 16801

Kevin was previously awarded \$1,200 as part of the research grant program and in May of 1991 he received the honor of being selected for the Student Research Award for his GSA proposal "A Study of Fracture Systems and Fossil Stress in the Allegheny Plateau near Ebensburg, Pennsylvania." Kevin and his advisor, Duff Gold, have been invited to attend the EGD luncheon in San Diego in the fall in recognition of this honor.

HELP WANTED

An important aspect of the Engineering Geology Division's long-range plan is to broaden the Division's program within the several GSA sections. Historically, the Division has concentrated its efforts on the GSA Annual Meeting, and individuals have from time-to-time taken responsibility for seeing that a section meeting has a session or two on Engineering Geology topics. However, there is a lot of geologic work of interest to engineering geologists that does not make it to the GSA Annual Meeting or even section meetings. Thus, it seems imperative that the Division take advantage of the sectional structure of GSA to provide additional opportunities for the Division's membership.

The Division needs volunteers who are interested in working on technical sessions, symposia, field trips, etc. that focus on Engineering Geology within its broadest sense. It is anticipated that committees will be formed whose purpose is to provide continuity from year-to-year between those interested in having Engineering Geology topics as regular parts of annual section meetings and the Technical Program Chairpersons of those sections. The key to the proposal is continuity, for there needs to be planning ahead for appropriate topics and coordination with Technical Program Chairpersons for a particular section's meetings. The time is ripe; the opportunities are there for you to have an influence on the direction the Division goes in the future. Why not "join up" for some satisfying intellectual fun? Please contact: Charles W. Welby, Chairman-elect of the Division, Department MEAS, Box 8208, North Carolina State University, Raleigh, NC 27695.

SAN DIEGO PROGRAM

The abstracts for the Division's Symposium **GEORISK ASSESSMENT** are in, and they promise a morning of interesting and stimulating papers. Topics range from ground-water contamination risk and risk assessment for landslides to use of geologic information for insurance purposes. The Symposium (S-3) is scheduled for Tuesday morning, October 22, 1991. Two field trips should be of particular interest to the membership; one pre-meeting trip is on October 20 - *Geologic Hazards in San Diego*, and a post-meeting trip is scheduled for October 25-26 on *Landslides in the Peninsular Ranges, Southern California*.

Three theme sessions are being sponsored by the Division: *Urban Geologic Hazards*, *Soil and Ground-Water Remediation Techniques*, and *Failure Mechanisms of Megaslides*. If your work or research involves movement of chemical in the vadose zone, you may want to participate in the short course, *Assessing the Mobility of Chemical in the Vadose Zone*, which is co-sponsored by the Engineering Geology Division.

ATTENTION STUDENT MEMBERS

In conjunction with the sponsorship of the short course, the Division offers a refund of \$50 of the course registration fee to each of the first five active current Student Members of the Division who take a short course sponsored by the Division. Here is an opportunity for student members.

The Awards Luncheon is scheduled for Monday noon, October 21st. Be sure to purchase your tickets during pre-registration, the 72-hour pre-luncheon ticket purchase cutoff is on Friday before the meeting. There may be some opportunity for "emergency" purchases offered through the Division, but the best way to assure yourself of a seat is to pre-register, or contact GSA Headquarters prior to the cut-off date. See you there!

CORRECTIONS

We received a couple of corrections on our last newsletter:

- 1) on Page 8 under the Awards Committee - it should read "Distinguished Practice and Meritorious Service".
- 2) the telephone listing for Perry Rahn was incorrect, it should be: 605/394-2461.

LETTERS TO THE EDITOR

COMMENTS & SUPPORT

Dear Sir:

I would like to comment upon - and support - much of what Engineering Geology Division Chairman Perry H. Rahn said in his Chairman's Message in the February 1991 issue.

I have spent many hours over the years arguing that engineering geologists must either become involved in promoting awareness of their profession among the general public, politicians, fellow geologists, and regulators, or accept a slow demise of the specialty as its territory is taken over by other specialties with trendier names.

Engineering geology has a proud heritage of drawing on almost every geologic discipline and subject in the solution of the myriad of problems we encounter in delivering geological information, opinions, and conclusions to engineers and others. Engineering geology has been around, in a practical sense, since the days of William Smith (1769-1839).

Should the Engineering Geology Division of GSA change its name to "Environmental and Engineering Geology Division?" You bet it should.

If we don't, somebody will soon start up an American Institute of Environmental Geology. This in spite of the fact that "environmental geology" by whatever definition is what engineering geologists have been doing for decades - since long before the environmental buzzword became popular. The profession will be further divided, and fine young geologists who like the ring of "environmental" and never heard of "engineering" will join it instead of an engineering geology association. The membership base of the engineering geology associations will be further reduced, their ability to serve the profession and to serve the public will fade, and, ultimately, the engineering geology associations and the specialty of engineering geology will fade, too.

Robert E. Tepel
767 Lemonwood Court
San Jose, CA 95120

would shorten the time it takes for a decision. Currently, a complaint is subjected to study by a geologists, a state Consumer Affairs investigator and the Attorney General's Office, is then heard by an administrative law judge and finally goes to the licensing board for a ruling - often several years after it was submitted.

- The board should be able to act on some complaints without the time-absorbing involvement of the attorney general. It should have a wider range of sanctions besides license suspension and revocation.

A peer review committee cannot be depended on to decide disputes impartially. Peers can be lethal to what is new or different. As in the case of a jury, decisions must come from persons who have no involvement with the issues. Legal guidance is essential, and there should be no tampering with rules of procedure simply to get expediency. The Attorney General's Office and the administrative law judge must participate no matter how long it takes. And there needs to be a provision for appeal. Otherwise the system will be laid open to abuses.

E. L. Krinitzky
Earthquake Engineering & Geosciences Division
Department of the Army
Vicksburg MS 39180-6199

FROM THE EDITOR

With the on-going controversy over the name of the Division, my philosophy is to print arguments for every side. Therefore, you will find letters and notes on behalf of all who care enough to write.

John R. Giardino, Editor
EGD Division Newsletter

FAULTS IN THE SYSTEM

I would like to warn against the following recommendations, carried in *The Engineering Geologist*, for dealing with wrong doing in our profession:

- A paid peer review committee of geologic experts to rule on some of the claims against professionals

CORRESPONDENCE

Here are some letters and responses sent to us by Jeffrey R. Keaton.

Ltr of 2/25/91 to Jeff Keaton from R. C. Mielenz (Gates Mills, Ohio)

SUBJECT: Mission Statement, EGD, GSA

I am writing to you on the above subject in your position as Part Chairman, EGD, because I do not know the mailing addresses of those who are cited as appropriate recipients of such comments on p. 3 of the The Engineering Geologist, Feb 91. Sorry about that!

I am not an engineering geologist in the generally envisioned purview of such a specialist. Rather, I deal primarily in engineering matters as a geologist-petrographer who is devoted to engineering materials, notably concrete and concrete-making materials. However, I did spend some 15 years in rewarding contact with engineering geologists contributing to civil engineering construction at the Denver office of the Chief Engineer, Bureau of Reclamation, U. S. Department of the Interior, 941-56.

With that out of the way, I offer the following comments concerning the draft Mission statement about the role of the Engineering Geology Division. I would like to see a more positive statement on the contribution that the geologist can make to engineering. If the Mission statement is intended to encourage use of an engineering geologist by engineering firms or public agencies, the draft statement falls short.

1. I find the term "Science of Engineering Geology" to be objectionable because "engineering" is not "science." It is an "art," that is, it is the application of scientific principles to a specific project always inextricably mixed with skillful application of experience and due regard for economic capability, requirements of time, and societal concerns, none of which necessarily is explicitly quantified beforehand. Also, EGD should emphasize dedication to Engineering Geology, not a vague concept of "Science." Hence, read "**** promotes the Science of Engineering Geology" as "**** promotes Engineering Geology."

2. Line 6 of the statement says that an objective is to provide members with state-of-the-art methods and techniques regarding environmental applications. The assumption appears to be that the members are not up to speed with regard to the current art. How about those geologists that are familiar with the state-of-the-art? Doesn't EGD have anything to offer? Doesn't GSA publish anything about new or advanced techniques? Are any such items restricted to environmental concerns? What is an "environmental application?" Does it mean "projects having an impact on the environment?"

3. Line 8 says that EGD provides information on "hazards and constraints affecting design and construction." How about the contribution of engineering geologists (and petrographer) in finding the most economical and maintenance-free path in tunneling, highway building, marine constructions, and the like? How about encouraging use of construction materials that otherwise would be rejected by standard tests? Let us use a positive approach.

I suggest consideration of a statement like the following:

The Engineering Geology Division promotes Engineering Geology by providing its members and others with new findings on current and advanced methods applicable to projects having environmental impact; concepts for defining best-path procedures and identifying hazards in design and construction of engineering works; contributions to use of rock and earth materials in construction and product development; and encouragement of research and development to these ends. These activities are conducted through publications *Reviews in Engineering Geology*, *Engineering Geology Case Histories*, annual meeting activities (field trips, symposia, theme sessions), and encouraging sponsorship of research.

I hope you find these suggestions helpful. Please forward this letter as you deem appropriate.

Sincerely yours,
Richard C. Mielenz, Ph.D., P.E., Member EGD

Ltr of 5/8/91 to Ms Faith E. Rogers, Editor, *GSA TODAY*, Geological Society of America, P. O. Box 9140, Boulder, Colorado 80301-9140.

Re: Global Perspectives (Environmental Geology) Editorial by Dr. R. Gordon Gastil in the March 1991 *GSA TODAY* and a response in print.

The subject editorial is disturbing to us, not as an affront of a poorly worded section or two, but as a misguided challenge and inappropriate definition. The editorial is now widely available. We request the same breadth of publication for our response--printing in an upcoming issue of *GSA TODAY*.

It is hoped that our letter adequately addressed our views. We are concerned that the topic will not receive a hearing in as broad a forum that the editorial received. This IS an important topic even if semantics are involved. As Editor, you choose to include or modify for print or eliminate material. Your decision to provide the platform for Gastil (even though controversy may not have been intended) requires an equivalent airing of opposing views. We request this letter to be printed in its complete form. We feel the topic and the disservice is that important! If many others feel exactly the same or have better addressed the subject, we would accept their alternative in print or a summary by an acceptable third party. Nonetheless, an obligation exists to GSA members, EGD

members, and the broader audience outside GSA to correct the moot, if not erroneous, concepts of the editorial.

Our concern is further amplified by being offered a court not of our choosing. Having a Forum at the GSA meeting in San Diego will be useful, if properly open to discussion, to specify the range of acceptance and agreement with the editorial. It is unlikely that positions will be mutually conceded at any Forum. Worse still, this Forum at the Meeting is only available to those who may attend it. Conflicts at the meeting with the Forum diminish its attendance from the Meeting's participants, without considering those who read the editorial but are unable to attend the San Diego Meeting.

Delaying the reflection of others trivializes the problem and impedes the consensus or solution. Awaiting November to address the issues raised in March may make the discussion more difficult. We hope that it can be addressed in the next *GSA TODAY*.

The offering of a "Forum" at the 1991 GSA Annual Meeting is unacceptable for lacking diversity of input, because of the limited audience it will reach, and for the postponement in establishing dialogue. Please print our response in full in the next available *GSA TODAY* and respond to us once you have made the decision to do so. Thank you for your attention to this important matter.

Sincerely,

Jeffrey R. Keaton and Gregory L. Hempen
1990 Chairman, EGD/GSA and 1990 President, AEG

Ltr of 5/8/91 to Dr. R. Gordon Gastil, c/o GSA Headquarters,
Meetings Department, P. O. Box 9140, Boulder, CO 80301

Dear Dr. Gastil:

This is a response to the editorial on page 53 of the March 1991 *GSA TODAY* regarding the 1991 GSA Annual Meeting. We are compelled to respond to the editorial because of our commitment to Engineering Geology and in consideration of our article co-authored in the February 1991 *Geotimes* (vol. 36, no.2). Primarily, we object to the definition of "environmental geology" as used in the editorial, the concept that "environmental geology" is new, and the notion that the 1991 Annual Meeting "started a movement in the right direction." We request that this response be given the same publication extent that your editorial received.

The editorial states that:

"Environmental geology means many things: it means geohydrologists devising ways to clean organic pollutants from aquifers; it means designing building sites that will not slide; it means writing codes that prevent development of the areas of greatest seismic risk; it means studying paleoseismicity that we can better understand the risks, and warn of earthquakes to come."

Before the late 1960s, the word "environment" in geology chiefly was used to refer to character of the source terrain of sediments or the character of the region of deposition of sediments (i.e., environment of deposition). Since the late 1960s, specifically the January 28, 1969, Santa Barbara Channel oil well blowout, the word "environment" took on a different perspective — the modification of the contemporary natural setting by human activity. In the 1970s, "environmentalists" were those whose efforts were aimed at preserving the environment by stopping "developers" from causing damage to the natural system (earth, water, and air). "Engineers" design and build developers projects, thereby contributing to environmental damage. "The engineering geologist, according to the editorial, "was seen as the lackey of bulldozing development, the diversion of rivers, and the onslaught of freeways."

We do not believe it is that simple. The need for attention to geologic factors in environmental impact statements (EIS) in the 1970s provided input opportunities for numerous geologists. These EISs required evaluation of the impact of the proposed development on the environment, whereas prior to the "environmental movement" the developers and their engineers were concerned with the influence of the environment

GEOLOGICAL SOCIETY OF AMERICA



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on the proposed development. It is the engineering geologist who identifies geologic conditions of importance to proposed developments, quantifies the frequencies and magnitudes of geologic processes operating at a site, and communicates with the engineer to allow design of developments that are compatible with their environments. Dr. Christopher C. Mathewson, at the time he became Chairman of the Engineering Geology Division of the GSA, developed a useful image of geologists, engineers, and engineering geologists. He views geologists as historians standing at the present and looking back into the geologic past to sort out the sequence of events using fundamental principles, such as Uniformitarianism (the present is the key to the past). The engineer stands at the present, looking back into the developed past to understand the performance of engineering materials (concrete, wood, steel, as well as earth — embankments and stone structures) and looking forward to the design life of a proposed development. Engineering geologists stand at the present, look back into the geologic past and forward into the future beyond the design life of proposed developments. The engineering-geology corollary to the Law of Uniformitarianism is, "the recent past is the key to the near future." Thus, engineering geologists, who traditionally have evaluated the impact of the environment on proposed developments, are also best qualified to evaluate the impact of proposed developments on the environment.

Environmental geology, as expressed by Ronald W. Tank in his edited volume *Focus on Environmental Geology* (Oxford University Press, 1973), "deals with the interrelationships of geologic processes, earth materials, and Man." Tank recognizes that the geologist should "be well equipped to contribute much toward the solution of a variety of problems concerning the physical environment" because of experience "in evaluating the earth's capacity for providing water, mineral resources, building sites, and waste disposal sites. Tank also recognizes that geologists have a unique perspective by virtue of knowledge of earth processes and earth structure and an enhanced appreciation of pristine environments (i.e., the impact of human activity). Engineering geologists traditionally evaluated the earth's capacity for hazards and provided water, building sites, and waste disposal sites. Once an economic geologist identifies an ore body, the engineering geologist assists the engineer with design of access roads, milling facilities, and tailings disposal facilities. Other examples abound.

The editorial states that environmental geology means "geohydrologists devising ways to clean organic pollutants from aquifers. We believe that geologists who specialize in evaluation of groundwater (sometimes called hydrogeologists) provide essential information regarding the movement of fluids in porous media under both Darcian and non-Darcian conditions. We believe that these hydrogeologists are engineering geologists as they are predicting future pollutant locations within the moving fluids and assist with the remedial solution. The engineering geologist contributes to "devising a way" to clean up the polluted aquifer by emphasizing its geologic characteristics and variability; however, the way devised to clean the pollutants must be designed by someone who understands the engineering characteristics of pumps (usually a civil engineer) or the chemical or biochemical characteristics of compounds for in-situ cleanup (usually a chemical engineer). The geologist should assist in deciding where the screened intervals

should be in a well; the geologist should not design the pump.

The editorial states that environmental geology means "designing building sites that will not slide. Design is an engineering function. To be sure, geologists have a major role in quantifying the geologic conditions of proposed building sites. Assisting an engineer in choosing a site or designing a foundation that will not slide is evaluating the influence of the environment on the site — an activity traditionally done by engineering geologists.

The editorial states that environmental geology means "writing codes that prevent the development of the areas of greatest seismic risk". Writing codes is not geology; it is sociology, public policy, public administration, urban planning, law, or some mix of these and other disciplines. Geologists certainly should participate in ordinance development for two reasons: 1) to provide an accurate representation of the likely range of geologic conditions, and 2) to explain the appropriate limits so that ordinances will be less likely to have requirements that are geologically impossible. Preventing development usually is not in anyone's best interest. We advocate responsible development. The areas of greatest seismic risk can be developed, but care and accurate prediction of likely future geologic events are required. The prediction of future events is based on accurate interpretation of the size and frequency of past geologic events.

The editorial states that environmental geology means "studying paleoseismicity that we can better understand risks, and warn of earthquakes to come. We believe that most geologists who conduct paleoseismic assessments consider themselves to be structural geologists, Quaternary stratigraphers, geomorphologists, or engineering geologists. The branch of the U.S. Geological Survey that deals with paleoseismicity is the Branch of Geologic Risk Assessment, formerly known as the Branch of Engineering Geology.

The editorial calls geologists to be "Protectors of the Earth", to help "avoid increased oil leakage on the sea floor" and "devise a plan that will prevent highly toxic mine water from entering the watershed". "Protector" implies to us shielding or guarding from harm — preserving existing conditions. Geologists who help to avoid oil leakage or toxic mine water seepage are participating in responsible development or use of the earth — they are not necessarily preserving existing conditions.

The editorial states "this is the age of ENVIRONMENTAL GEOLOGY" with "burgeoning new fields. We would like to comment on the three topics, polluted aquifers, stable building sites, and seismic hazards, used in the editorial to demonstrate what environmental geology means. In a chapter on Underground Waters, the following statement appears under the heading "Pollution by drainage wells:

"The use therefore of drainage wells for carrying off sewage or industrial wastes is often exceedingly dangerous, and should in the opinion of many be prevented by legislation, especially in those areas where it is likely to contaminate water supplies." (p. 314)

This statement appears, not in a book on environmental geology, but in a book entitled *Engineering Geology* written by Heinrich

Ries and Thomas L. Watson in 1915 (published by John Wiley & Sons, New York). *A Comprehensive Treatise on Engineering Geology* written by Cyril S. Fox in 1935 (published by the D. Van Nostrand Company, New York) contains chapters on Underground Water Supplies and Quality of Water. The classic "Berkey Volume" of the Geological Society of America entitled *Application of Geology to Engineering Practice* published in 1950 contains a chapter by O.E. Meinzer entitled *Geology and Engineering in the Production and Control of Ground Water*. Meinzer (p. 166) notes "a sand deposit assures relative safety, whereas a cavernous limestone may furnish no protection against pollution" and "wells should be located, insofar as possible, upgradient from possible sources of pollution." Similarly, the 1957 textbook *Principles of Engineering Geology and Geotechnics* by Dimitri P. Krynine and William R. Judd (McGraw-Hill Book Company, New York) contains a chapter on Subsurface Water. In 1966, the Los Angeles (now Southern California) Section of the Association of Engineering Geologists (AEG) appointed Richard Lung and Richard Proctor editors of a special publication *Engineering Geology in Southern California*. John F. Mann wrote a section on Ground Water in Southern California and Edward J. Zielbauer wrote a section on Sea Water Intrusion and the Barrier Projects. Clearly, groundwater management and aquifer protection were and persist as important issues to engineering geologists long before the environmental movement made them popular topics.

Landslides, similar to groundwater issues, are well documented in the early textbooks on Engineering Geology. Ries and Watson (1915, p. 342 ff.) describe "Landslides and Their Effects," recognizing the combined influence of rock structure, sediment strength, and excavation geometry. Fox (1935) has a chapter on "Stability of Hill Sides and Cliffs" and one on "Building Sites." In addition to describing the geologic factors contributing to slope failures, Fox (p. 246) describes some methods that may be used for stabilizing moving slides. The 1950 GSA "Berkey Volume" contains a classic chapter by Karl Terzaghi entitled "Mechanism of Landslides." It is in this chapter that Terzaghi (p. 91) addressed the erroneous concept of the "lubricating effect of water" in contributing to slope failures. Krynine and Judd (1957) have a chapter on "Landslides and other Crustal Displacements," a chapter on "Buildings: Site Exploration and Foundations," and a chapter on "Earthwork." F. Beach Leighton wrote the section on Landslides and Urban Development in the AEG special publication on *Engineering Geology in Southern California* (Lung and Proctor, 1966). Thus, slope stability and stable building sites were and persist as important issues to engineering geologists long before the environmental movement began.

As with the groundwater and slope stability issues, the early textbooks on engineering geology contain chapters on seismic hazards. Ries and Watson (1915, p. 184) describe fault movements as a cause of earthquakes and note that "structures standing on hard rock are less violently shaken (other things being equal) than those on unconsolidated material." Fox (1935) has a chapter on "The Earth's Tremors" and describes "Earthquake Considerations affecting Sites" in his chapter on "Building Sites." He notes:

"A fault once formed continues to be a plane of weakness along

which further movement is likely to take place. Several faults are known on the opposite sides of which the strata have been displaced by upwards of 1,000 feet. This relative movement has seldom taken place in larger displacements than 20 feet at a time, and generally, by a much smaller amount; it thus represents the accumulated displacements of countless small movements, and it is for this reason a geologist speaks of the growth of faults. The line of a fault is consequently an unsafe place upon which to build a stone structure of importance." (p. 247) Fox (1935, p. 249) further notes "with regard to the location of buildings ... avoid heterogeneous and friable soil, especially if it is of little thickness and on a steep incline ... avoid soft, pasty, marshy ground, also filled up and embanked land."

George D. Louderback wrote a chapter entitled "Faults and Engineering Geology" in the 1950 GSA "Berkey Volume. Krynine and Judd (1957), in a chapter on "Earthquakes and Aseismic Design," discuss the concept of seismic risk and suggest:

"As soon as the intensity detrimental to the planned structure is established, the probability of the earthquake of this intensity in the given region should be estimated. Statistical data on observed earthquakes and knowledge of the local geology are of help in this connection." (p. 672)

The AEG special publication *Engineering Geology in Southern California* (Lung and Proctor, 1966) was prepared for the Annual Meeting of the Association of Engineering Geologists which was held in Anaheim. The theme of that meeting was Faults and Earthquakes and their Influence on Engineering Works. Certainly, seismic hazards and paleoseismology were and continue to be important issues to engineering geologists long before the environmental movement began.

Consistent in our response to the editorial's examples illustrating environmental geology are subjects that have been addressed by engineering geologists for over 100 years, as Dr. George A. Kiersch describes in a soon-to-be-released GSA DNAG publication *The Heritage of Engineering Geology: The First 100 Years 1888-1988*. The "burgeoning new fields of Environmental Geology in the editorial appear to us to be burgeoning bandwagons drawn by the "Environmental" buzz-word. The editorial staff of *Geotimes* places Environmental Geology, along with Water Pollution, Hydrogeology, Desertification, and Urban Planning and Land Use, under the heading ENVIRONMENTAL in the February 1991 Annual Summary issue. The section on Environmental Geology by Alan E. Kehew (p. 50-51) was restricted to a discussion of the status of low-level radioactive waste disposal in the United States. Apparently what Environmental Geology means to Dr. Kehew is different from your all-encompassing form. Hydrogeology, as stated by Joseph S. Rensselaer, John E. Moore, and Warren W. Wood (*Geotimes*, February 1991, p. 51), "has evolved as a specialized field of geology in response to social and technological pressures." They further recognize a valuable new text book on hydrogeology, *Physical and Chemical Hydrogeology*, by P.A. Domenico (Texas A&M University, College Station) and F.W. Schwartz (Ohio State University, Columbus)... Dr. Domenico is a member of the faculty

in the Center for Engineering Geosciences at Texas A&M; thus, the nexus between hydrogeology and engineering geology is strong and often indistinguishable.

The editorial staff of *Geotimes* places Engineering Geology, along with Petrophysics, Exploration Geochemistry, Mining and Construction, Mapping, Geoscience Information, and Geological Computing, under Technology which is one of the subheadings under ECONOMIC GEOLOGY. In our section on Engineering Geology (*Geotimes*, February 1991, p. 21-22), we recognize that many geologists view the human interaction aspect of geology as environmental geology and note that the Engineering Geology Division of GSA is giving serious consideration to changing its name to incorporate the increasing emphasis on environmental issues, even though engineering geologists have been practicing "environmental geology" for more than 100 years, as indicated above. We also call for the support of the entire geologic profession and recognize that:

"All of our communities are affected by engineering and geologic decisions. Some of these determinations are made with no input from geologists, perhaps increasing the potential for damage due to geologic hazards or structural risks. Information from geologists, chiefly in states without geologic licensing, would promote a more thorough understanding of geologic systems as these affect community needs in ground-water availability, hazardous-waste mitigation, construction, scientific education, and other endeavors."

Research in a subdiscipline of geology is properly termed with that specialty's adjective or suffix (i.e., economic geology and hydrogeology). The use of this research by a geologist to solve the problems of human interaction with the environment have been Engineering geology for more than 100 years. Environmental geology, on the other hand, is a phrase that is less than 20 years old, but is attractive to many geologists who may be uncomfortable with the word "engineering". [For many years the GSA abstract form has had a box for Environmental Geology. Those volunteered abstracts dealing with environmental geology have always been reviewed by the Engineering Geology Division and organized by the Engineering Geology Division representative to the Joint Technical Program Committee.] Burgeoning new fields of environmental geology? No, we believe they are traditional fields of engineering geology when applied to the works or actions of Mankind.

Finally, the editorial makes a hopeful statement that when the 1991 GSA Annual Meeting is put to rest, that we, as individual members of the GSA, will have a "feeling that WE DID IT — that we started a movement in the right direction." The traditions on which the Geological Society of America is based are being discarded by those who have not made the effort to understand the foundation upon which the scientific achievements of the 1970s and 1980s rest. The movement in the right direction" began over 100 years ago with the geologists who recognized the importance of accurate geologic information in all aspects of human activities. Initially, human developments were directed at improving the quality of life. Lifestyle

changes brought the development of natural resources and a shift from an agricultural base to an industrial base. Along with the shift in base came a population concentration in urban areas and society's fundamental problem: people pollution.

The geologist's role in society should be one of wisdom and balance. If the quality of life is to be maintained where it is good and improved where it is poor, environmentally compatible development alternatives must be devised, tried, and improved for the common good. The entire geologic profession should participate in this endeavor at some level. Engineering geologists have the greatest experience in communicating with engineers to translate geologic information into design parameters. We recognize that geologists who specialize in subdisciplines, such as hydrogeology or neotectonic geology, may feel strongly that they are not engineering geologists because they do not communicate directly with engineers in the translation of the geologic information. The translation is essential, however, if the information is to be relevant in the sense of environmentally responsible developments. Engineering geologists have been focusing on this type of relevant endeavor for over 100 years. The movement in the right direction apparently has just been noticed by those whose employment directly depends on environmental protection legislation. Perhaps such legislation is the source of the buzz-word "environment" and the perception that "burgeoning new fields of Environmental Geology" are not actually traditional fields of engineering geology.

Respectfully submitted,
Jeffrey R. Keaton & Gregory L. Hempen

TRAVEL GRANT

THE GSA IS ACCEPTING TRAVEL APPLICATIONS FOR THE 29th INTERNATIONAL GEOLOGICAL CONGRESS IN KYOTO, JAPAN - 1992

This program was established as a final act of the Organizing Committee for the U. S.-hosted 28th IGC held in Washington, D. C. in July 1989. Surplus funds available at the conclusion of the 28th IGC were transferred to the GSA Foundation with the stipulation that income from the fund be used to support the attendance of young geoscientists to future IGC meetings until such time as the United States again hosts an IGC. Travel grants will consist of economy airfare to Japan and prepayment of the registration fee.

To be eligible an applicant must be a resident or citizen of the United

States (includes students); must have a birthdate after 8/31/52; and must have submitted an abstract for inclusion in the program of the 29th IGC.

Official application forms are available from the
Grants Coordinator, GSA Headquarters
3300 Penrose Place, P. O. Box 9140
Boulder, CO 80301.

Along with applications - you must include a copy of your abstract, two letters of recommendation from current or recent supervisors (students may use faculty members). **Qualifying applications and letters of support must be postmarked no later than October 31, 1991.** Applicants will be notified of results early in 1992.

NEWSLETTER

If you have any suggestions, corrections or input for the next issue of *The Engineering Geologist* please contact the editor or his assistant at Texas A&M University, Department of Geography, College Station, Texas 77843-3147. Phone (409)845-7141.

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